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# An Extensive Proposal for Vertical Handoff Technique in WLAN

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***Abstract—*** *Vertical handoff is the one of the most powerful hidden weapon of the wireless network scenario. As the whole world of digital electronics is moving towards internet of things as result of this vertical handoff becomes a much needed seamless connectivity tool to enhance the paradigm. Now a days many of the digital electronic devices are been inventing to boost the smaller networks like in office, universities and companies. So an inverse arise of need for vertical handoff in the WLAN is on much priority like never before. Many of the systems are existed to provide vertical handoff without degrading or interrupting the data access facility in WLAN. In most of the vertical handoff mechanism the load is put on the mobile nodes to look over the data flow mechanism in the established WLAN. This may add some contribution to increase the delay in the delivery of the data in the established network. So as an efficient answer to this, this paper put forwards an idea of vertical handoff mechanism using the pool manger in the network and put the burden on the mangers to take care of the handoff process, so that the data delivery rate can be increased. This process is designed based on the tile (i.e. time) in the said pool (pool tile vertical handoff – PTVHO) which is catalyzed by fuzzy logic to measure the handoff parameters efficiently.*

***Keywords— Pool , Vertical handoff, Avanche effect , WLAN, Fuzzy logic.***

## I. INTRODUCTION

The WLAN is having high infiltration of IEEE 802.11n and the blast in the quantity of cell phones, tablets and portable workstations. In later a long time, alongside the movement from open air to indoor use is making different difficulties for system administrators who wish to oblige client needs, for example, higher throughput, an extensive variety of utilization activity sorts and broad indoor scope. Most web access designs depend on the Wireless Local Area Network (WLAN) innovation as the "last-bounce", however this is making a bottleneck in the generally speaking framework. WLAN innovation characterized by the IEEE 802.11 standard family conveys regularly expanding information rates with each new standard. Case in point, 802.11n with channel holding, most astounding Modulation and Coding Scheme (MCS), 400 ns monitor interim, Multiple Input Multiple Output (MIMO) Orthogonal Recurrence Division Multiplexing (OFDM) is fit for advertising up to 600 Mbit/s physical layer information rates, while the more up to date standard 802.11ac will present to 7Gbit/s for the 5GHz band. As of now, 802.11n stays to be the standard with the most astounding entrance rate in the business sector, including Access Point (AP)s and end-gadgets. Our preparatory results are assembled for 802.11n, yet the exhibited mechanized setup is not constrained to a specific standard.

As the WLAN deployed across wide area it gains a lots of attention of device, vendors, network operators and many more entities for evaluating the quality of experience criterion of network. Basically quality of service is an application layer concept, but it ranges up to the lower layer and associated with the various parameters such as strength of received signal, delay, rate of data, jitter and so on. The individual performance of access point plays a crucial role in evaluation of QoE. Access points having same configuration might be behave differently for different chipsets, firmware, power management, position of antina placement etc.

The 2-stage submits (2PC) is a distributed technique of deciding whether to commit the transaction or not in a distributed environment. In this way, through 2PC a consistent choice is come to and implemented among various servers whether to submit or prematurely end a given exchange, thus to ensure the atomicity. The protocol continues in two stages, i.e. voting and choice stage, which clarifies the convention's name. The convention is executed by a facilitator process, while the partaking servers are called members. At the point when the exchange's initiator issues a solicitation to confer the exchange, the facilitator begins the principal period of the 2PC convention by questioning by means of get ready messages all members whether to prematurely end or to confer the exchange. On the off chance that all members vote to submit then in the second stage the facilitator illuminates all members to confer their offer of the exchange by sending a confer message. Something else, the organizer trains all members to prematurely end their offer of the exchange by sending a prematurely end message. Proper log passages are composed by organizer and additionally members to empower restart methods in the event of disappointments.

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The 2PC convention assumes that single and distributed transaction makes use of different resources hosted by various asset directors (e.g., database frameworks, record frameworks, informing frameworks, relentless programming situations), which live on potentially distinctive hubs of a system and are called members of the convention. For each exchange one facilitator process, normally running on the hub of that member where the exchange was started, expect obligation regarding executing the 2PC convention. The states through which facilitator and members move over the span of the convention are outlined in Fig. 1 and Fig. 2, resp., what's more, clarified in the accompanying. Such state charts speak to limited state automata, where ovals indicate states, marked curves signify state exchanges, and circular segment names of the structure "precondition/activity" demonstrate that (a) the state move is just empowered if the precondition is fulfilled and (b) the given activity is executed when the state is changed.

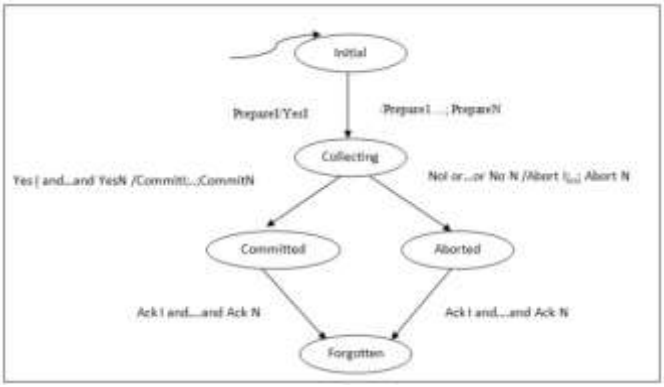


*Fig.1: State Chart for Coordinator (Given N participant)*

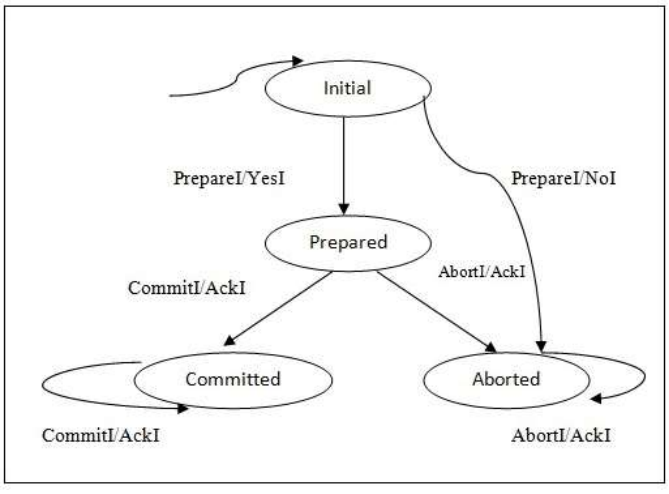


*Fig.2: State Chart of Participant I*

The basic working pattern of two phase commit protocol can be depicted in figure 3.

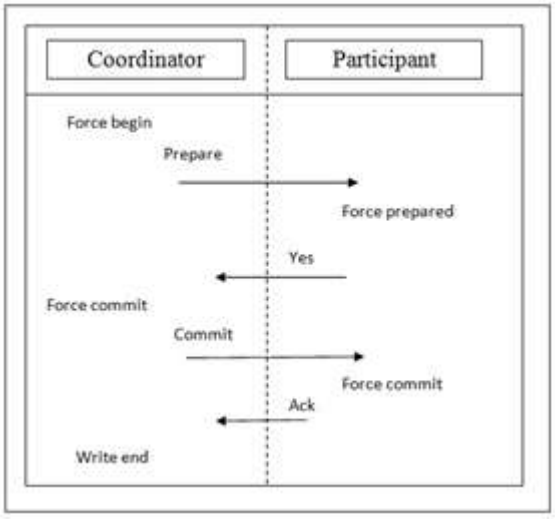


*Fig.3: Action of transaction commit in the basic protocol*

Number of areas is there which makes use of 2 pc protocols, it used in all such applications where the nature of data is decentralized and need to share across the multiple clients along with the guarantee of transactions. E.g. ecommerce, E-science etc. more precisely it is worth to say that two pc protocol s best suit for the database systems, transaction processing monitors, and the queued message systems.

It is theorized that the 4G system will be a brought together system that will incorporate various existing remote systems. The heterogeneous remote access systems will be interconnected with each other by means of an Internet Protocol (IP) system spine and the web. The primary idea and thoughts that drives the 4G systems are:

- All-IP system foundation move
- Support for various wireless access technologies such as WPANs, WLAN, and UTRAN etc.
- support of consistent handovers crosswise over both heterogeneous and homogeneous remote systems

A handover is viewed as consistent when it gives both i.e., smooth (no or next to no bundle misfortune) and quick (low dormancy) exchanging of dynamic association between the heterogeneous access systems. The trending research studies shows that the two crucial wireless techniques i.e. WLAN and UMTS gained lots of attention. 53.6% research focused on the issue of next generation network system i.e. consistent versatility feasibility over the coordinated UMTS and WLAN system.

The rest of the paper is organized as follows. Section 2 discusses some related work and section 3 presents the purposed methodology. The details of the results and some discussions we have conducted on this approach are presented in section 4 as Results and Discussions. A section 5 concludes this paper with our approach.

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## II. RELATED WORK

SuKyoung Lee et al have developed a vertical handoff decision algorithm that enables a wireless access network to not only balance the overall load among the attachment points(e.g. Base Station(BSs) and Access Points(APs)) but also to maximize the collective battery lifetime mobile nodes(MNs). They devised a route selection algorithm to forward data packets to the most appropriate attachment point in order to maximize the collective battery lifetime as well as maintain load balancing. But still a mechanism is required for controlling variations in bandwidth when mobile node goes from low to high or high to low bandwidth network .also required to improve energy efficiency then consider network cost function while switching of network. it also consider user preference during handoff decision. Then network security is also important [1].

R.Tawil et al have proposed a vertical handoff decision scheme to enhance the service mobility using the Simple Additive Weighting (SAW) method in a distributed manner, under heterogeneous environments. Their goal is to reduce the overload and the processing-delay in the mobile terminal, by delegating the calculation of handoff metrics for network selection to the Target Visiting Networks. It mainly focus on to reduce overload and processing delay. It need to consider network cost, power consumption factor along with bandwidth, velocity etc [2].

Shengdong Xie et al have proposed a new vertical handoff decision algorithm to minimize the cost of the heterogeneous wireless networks. They calculated the block probability of new calls and the drop probability of handoff calls in cellular network and WLAN under the channel-guard call admission method, and proposed a cost function which is based on the block probability and drop probability. Then they obtained the radius of WLAN by simulated annealing (SA) method to minimize the cost .here required to consider other factors like data rates, bandwidth, power efficiency, latency etc for effective handoff. [3].

Wireless LAN technology i.e. WLAN defined by IEEE 802.1 standard delivers a high proportion of raw data rates with each new standard. In reality this raw data problem will not going to reflect real word performance of end users. For calculation of performance measurements of WLAN for access points [4] elaborates the technique which makes use of network performance parameters. The main intention of the paper is to define a simple line for benchmarking to find the best suit of devices. As per the author this set up is capable of calculating the different parameters such as data rate, RSSI and jitter in WLAN uplink and downlink. In this paper, author proposed a robotized setup for assessing the system execution of WLAN APs. He considered reasonable use-cases and tried the end gadgets as they are expected to be used by the end clients. The examination of the DUTs utilizing dependable and repeatable convention for execution assessment yields a chance to make a pattern. The setup proposed is likewise effortlessly versatile to diverse situations. His estimations demonstrate that the gadgets report the RSSI esteem with abnormal state of accuracy. In this way, the RSSI qualities could be viewed as a decent contender for crowdsourcing. Our future work is prone to concentrate on breaking down.

[5] Discussed a technique which makes use of LAN and WLAN for setup of dynamic local power dispatch system. Today, raising fuel costs has further exasperated the' worldwide worry about the developing energy emergency. Numerous vitality scientists of today center after finding new courses in sparing vitality and more viable techniques for force control and dispatch. This paper discusses Artificial Intelligence (AI) ideology and utilizing advanced Two-way remote RF signals through Neighborhood (LAN) and wide Area Network (WAN) associations with setup a Dynamic Local Area Power Dispatch System (LAPDS). The LAPDS won't just effectively dispatch the heap stream yet its fused AI ideas will decrease the force request amid top periods in light of an arrangement of value rebate for various times of the day. At the end part authors conclude that the system factory energy loss can be reduced up to 14 %.

For maintaining the scalability of metadata service [6] illustrates the one phase commit protocol having low atomic overhead. The main focus of the paper is to manage the distributed operations such as Create, Delete, and Rename. We propose a one stage commit protocol that is custom-made to the utilization for common between metadata messages. We depend on a quick, exceptionally accessible shared stockpiling for metadata with a specific end goal to minimize composes, messages, coordination overhead and recuperation time in instance of coming up short metadata servers. We exhibit a formal portrayal of the new convention, a hypothetical investigation of its abilities, a proof of accuracy and the assessment of the convention in a reenacted environment that renders the convention to be quick and dependable. In recreations the convention accomplished more than half better execution contrasted and the two stage responsibility convention.

As discussed transaction management plays a vital role in any database management system. This paper makes use of 2 pc commit protocol as a base of their study. It considers the bottleneck of 2pc and proposed a new commit protocol known as 3 pc commit protocol.

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In 2PC, we watched that if two side exchange will perform in 2PC (i.e., one side called sender and other side called a beneficiary). At the point when sender side speaks with the recipient side through performing introductory qualities plan for submit or prematurely end message. The have the a few potential outcomes both sides that are, case 1-if the sender side sends the confer information to collector side
that might submit both sides. Case 2-if the sender side sends the information however information will prematurely end to the sender side and the collector side likewise information will prematurely end. Case 3-if the sender side sends the confer information to collector side yet beneficiary side information will prematurely end. Case 4-if the sender side sends the confer information however collector side, won't guarantee that data will commit or not.
By and large, as indicated by all potential outcomes, we have four cases which are connected. We researched that information is not certain from both side (sender side and collector side). In this paper we likewise watched that on the off chance that 3PC will utilize such kind of cases then it will abstain from blocking issues, in light of the fact that after prematurely end/fizzled the information of2PC convention. Information is blocked and lessened the blocking issue through 3PC systems [7]. It has one dynamic information for reinforcement; if fizzled/prematurely end the information to both sides. It has put away and includes different destinations for choice pays for conferring not for prematurely end. It is called pre-submit choice process and record of the information are put away in different destinations (i.e., K destinations), and we additionally actualized 3PC Algorithm in this paper.
[8] Talks about the most prevalent portability administration convention for the incorporated heterogeneous remote systems i.e., MIP. From the writing overview it can be watched that the MIP is not a proper decision to accomplish the consistent portability. The reason is the high number of flagging and hub process cost amid handoff which can't be minimized by executing the hard handoff strategy.
In his examination article, an exhaustive dialog on the parallel movement transmission idea has been exhibited. Also, with a specific end goal to diminish the flagging and hub preparing cost for the consistent portability administration, the proposed MSVHOP convention executes parallel flagging transmission. On account of parallel flagging transmission amid the handoff, the productive VHO is performed by sending the greater part of the VHOs flagging messages to the objective system in parallel with the officially settled information session with the past system. In this way, just few flagging messages impact the general VHO execution. Moreover, the relationship of transient lost data with the distinctive VoIP codec has been talked about and introduced. Our future research concentrates on the examination of vertical handoff convention by contrasting the proposed convention and the contemporary internetworking conventions, for example, MIPv4, MIPv6, and SIP and so on.
[9] Proposed a revised algorithm of vertical handoff for WWAN's and WLAN overlay networks. After the implementation of the technique author concludes the following points Heterogeneous portable systems, for example, WLAN and WWAN require productive handoff systems to ensure consistent network. A productive consistent vertical handoff calculation for portable stations was proposed to control the vertical handoff operations in the interworking systems to give constantly best associated administration. The situations actualized with the distinctive interworking models were looked at and the outcomes demonstrated that the interworking design at SGSN level gives better reaction time and low idleness to give a consistent handoff. The recreation result demonstrates that the proposed calculation empowers the versatile client to get benefit persistently with least bundle misfortune and delay. As a major aspect of future work handoff with LTE can be executed.

## III. PROPOSED METHODOLOGY

In this section, we describe our framework for PTVHO in WLAN scenario with the below mentioned steps as shown in figure 4.

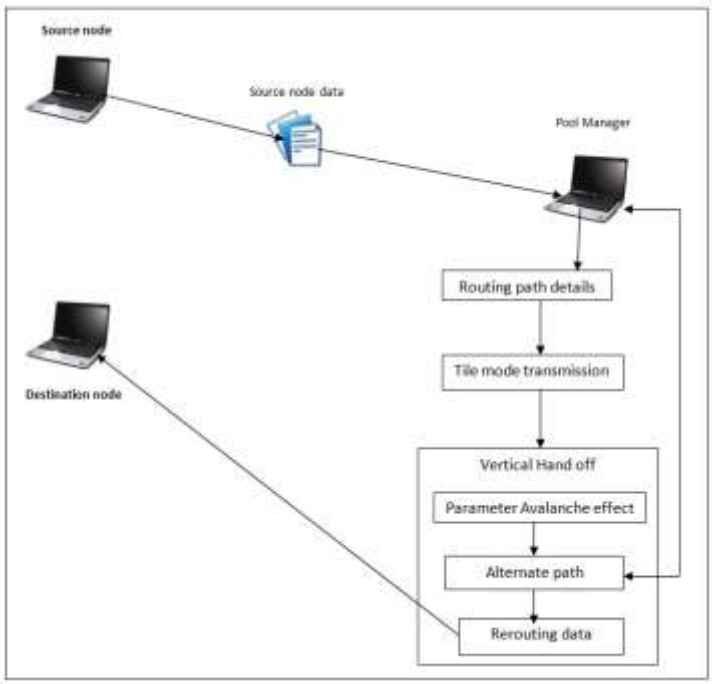


*Fig.4: Overview of the proposed work*

*Step 1:* Here in this step a WLAN is been setup for our experiment using the standard configuration of the machines

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using in today's scenario with D-Link 300 Mbps ADSL wireless router. Then some nodes are given the role of the managers and they called as pool managers. Many nodes are been named under a head node or pool manager which leads to create a perfect pool of nodes with a pool manager. Fig 5 and Fig 6 respectively demonstrate the setup process of WLAN and WLAN pools with pool managers.

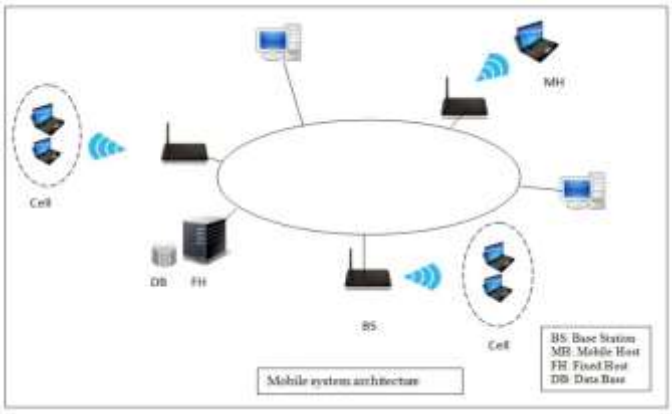


*Fig.5: WLAN Setup*


*Fig.6: WLAN POOL with pool managers*

*Step 2:* Here In this step data transfer mode is been maintained using efficient two phase commit protocol with the help of pool managers. Where every pool managers are powered to hold the routing details of the data from sources node 'S' to destination node 'D'. Every pool managers are having the resources of complete WLAN with all details; this eventually breaks the vast WLAN into numerous blocks as referred as pool in our scenario. So handoff will be taken place when data jumps from one pool to another pool that may belong to different node setup.

*Step 3:* To show the effective vertical handoff procedure our approach uses the pool tile method. As the data transfers from one node to another data is been carrying in between a given tile (That is time t).

The node which forwarded the data which carries the data referred as previous data and node which receives the data refer as current data labeled by 'p' and 'c' respectively.

And every time as the data transfers the trace of the previous and present data are been recorded by the pool manager in the form of an extensive hash key. As this hash key is on the prone to the change an avalanche effect is been recorded by the pool manager to sense a changing of the pool or network.

Then immediately it insists the instance source node which carries the current data which is been rerouted to the new set of path as directed by the pool manager to carry on effective vertical handoff. The complete process of the vertical handoff can be depicted in the below flowchart.

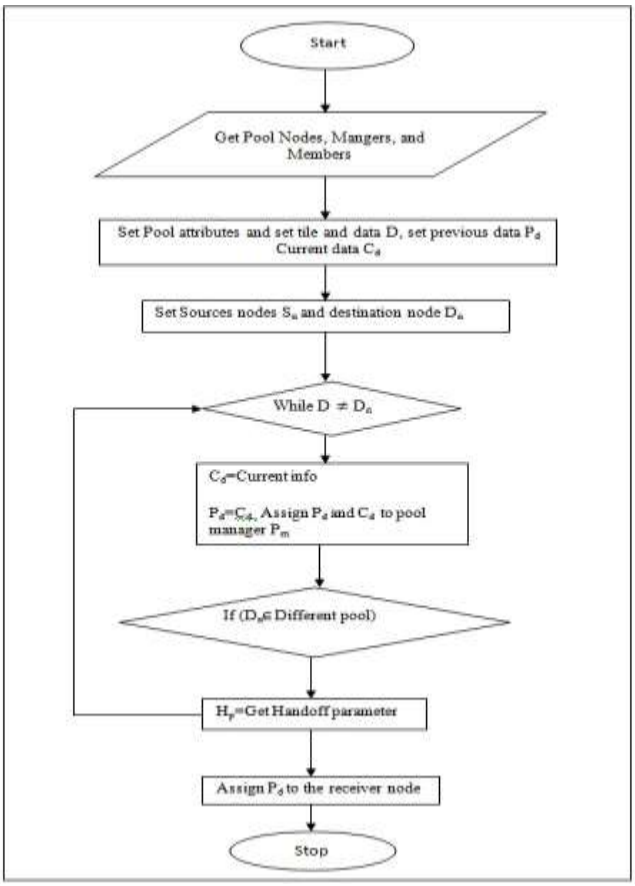


*Fig.7: Flowchart for vertical Handoff*

Blank call Identification process through Vertical handoff-

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As an extended arm of our approach, the proposed idea is capable of identification of blank calls whenever vertical handoff is happened from one pool of network to another pool; each time pool managers are record the data flow size and check for the threshold. That means if someone is talking then more data will be transferred over the network. On the other hand if someone is called to destination and only keep mum over the phone then amount of data that is been transferred is minimum over the network.

Pool managers will record this drop of data flow and keep a record of the source node.

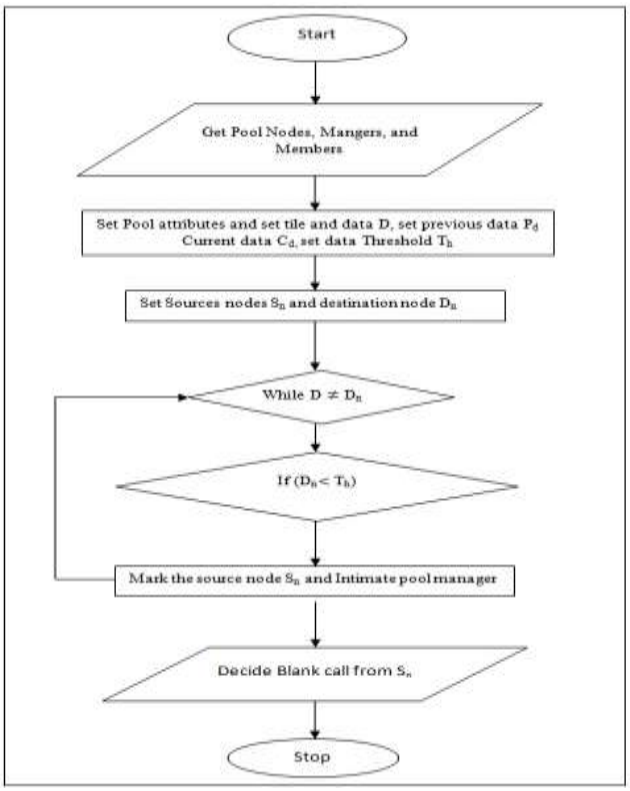


*Fig.8: Flowchart for Black Call Identification*

## IV. RESULTS AND DISCUSSIONS

Unlike many systems that are developed vertical handoff mechanism of for a simulated environment our approach is complete opposite to this, as our system is developing in real WLAN which enables us to help reduce the complexities of the virtualization process when they have to deploy in real.

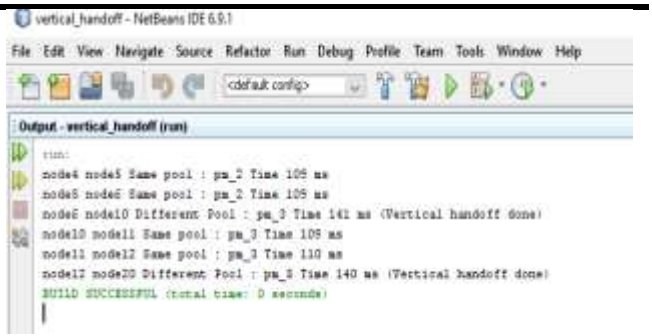


*Fig.9: Simulated Output*

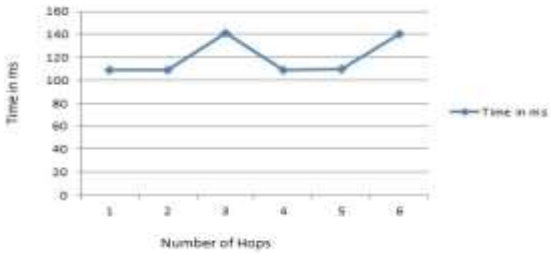


*Fig.10: Performance Graph*

The above plot indicates time taken by the pool managers to change the pools from one to another when the source node and the destination nodes belong to different pools. The recorded time can be shown in below table.

| Time in ms | Pool status |
|---|---|
| 109 | same |
| 109 | same |
| 141 | Different |
| 109 | same |
| 110 | same |
| 140 | Different |

The table and the plot together indicate when the node belongs to different pools then there will be a slight increase in the timing. This indicates a sign of good vertical handoff frame.

For experimental setup system is considering D-Link 300 mbps ADSL double antenna router with the standard computer configuration with minimum of core i3 processor with 4 GB of primary memory. Number of the computers are involved in the experiment is based on the number of WLAN pools that we are going to setup. System is developed on java based machines with Net beans as IDE.

We first verify that the proposed system of PTVHO can reduce the unnecessary burden on the mobile nodes for vertical handoff in WLAN effectively.

When our method of vertical handoff of pool tile method (PTVHO) is compared with that of vertical handoff based on the movement – aware of the nodes [100] in WLAN for

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the changing of the network along with the time constraint. We found a plot as shown in figure 7, which clearly depicts that vertical handoff of our approach PTVHO uses less number of handoff than of [100].

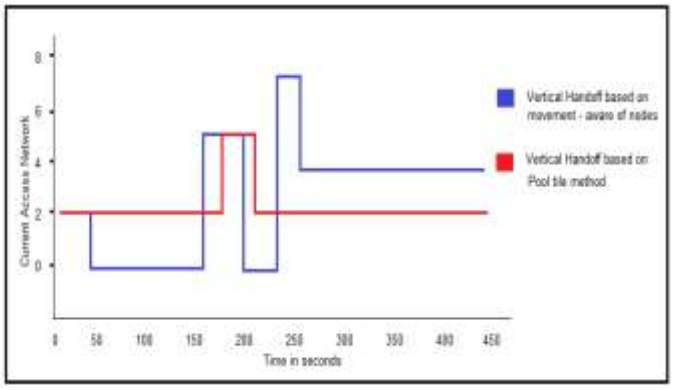


*Fig.11: Comparison for number of Handoffs*

This shows system will over performs in reducing the redundancy of the mobile nodes as they are less equipped with the desired resources and whereas the PTVHO system uses the pool managers which are rich in resources can take efficient decision of handoff by considering all possibilities.

## V. CONCLUSION

The proposed method of PTVHO efficiently uses the pool managers for taking the decision of handoff effectively as most number of mobile nodes are not equipped with the high resources. Introduction of pool managers raises the efforts of handoff techniques in WLAN as there are many small and medium level devices are there which are insufficient of taking the decision due to lack of resources. So we can say that our idea of PTVHO will definitely put some contribution to improve handoff techniques in WLAN.

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